Performance Tested Comfort Systems® Duct System Diagnostic Field Guide, Program Standards, Testing Procedures and Reporting Forms

October 1, 2003

Northwest Energy Efficiency Alliance

These protocols and standards were originally developed for Climate Crafters by the Washington State University Cooperative Extension Energy Program. They have been revised by the Regional Technical Forum. The Performance Tested Comfort Systems Program and Climate Crafters organization have been supported by the Northwest Energy Efficiency Alliance.

Duct System Diagnostic Procedures

Testing Protocols

The required procedures for performing the following tests are contained in this manual.

1. **Total Duct Leakage Test**
2. **Duct Leakage to the Exterior Test**
3. **Combustion Appliance Zone Pressure Test**

Certification of a duct system under the Performance Tested Comfort Systems® (PTCS®) specifications requires that one or more of these tests are performed on each system. A technician certified by Climate Crafters or equivalent independent third party organization shall complete the certification process and shall provide documentation of the test results showing compliance with PTCS® standards to Climate Crafters or equivalent independent third party organization.

Table 1 shows the circumstances under which each test is required.

In existing homes, testing is required both before and after sealing. Existing homes that meet PTCS® standards without additional sealing may be certified.[1] A home must be occupied for a least one year before it is eligible to be certified under the existing home standards.

Table 1 - Minimum Performance Testing Requirements

Type of Home	(1) Total Leakage		(2) Leakage to Exterior			(3) Combustion Zone
New Home No Combustion Zone	**X**	**or**	**X**			
New Home with Combustion Zone	**X**	**or**	**X**		**and**	**X**
Existing Home No Combustion Zone			**X**	**or**		
Existing Home with Combustion Zone			**X**	**or**	**and**	**X**

[1] Utilities cannot claim credit for energy savings for such homes under the Bonneville Power Administrations Conservation and Renewable Resources Rate Discount Program. However, PTCS® certified contractors should check with sponsoring utilities for availability of and eligibility for incentive payments for such homes as local program offerings differ.

Performance Tested Comfort Systems® Duct Sealing Program Standards

New Construction: Based on the protocol for "Total Leakage Testing", or "Leakage Testing to Exterior" duct leakage in new construction shall not exceed 0.06 CFM_{50} x floor area served by the system (in square feet), or 75 CFM_{50} whichever is greater. In addition the following requirements must be met:

1. All *testing* must be done by a Climate Crafters or equivalent independent third party organization Certified Technician or Inspector;

2. Duct systems must be designed, sized and installed using recognized industry standards so that calculated heating and/or cooling loads are delivered to each zone;

3. Based on the protocol for "Combustion Appliance Zone Pressure Testing" forced air system operation shall not de-pressurize a combustion appliance zone by more than 3 Pascals.

4. When combustion appliances are located within a conditioned space a UL listed carbon monoxide alarm, or equivalent shall be installed.

Existing Homes: Based on the protocol for testing "Duct Leakage to the Exterior", duct leakage in a retrofitted system shall:

1. Be conducted by a Climate Crafters or equivalent independent third party organization Certified Technician or Inspector:

2. Not exceed 0.10 CFM_{50} x floor area (in square feet) served by the system;

- OR -

3. be reduced by 50% by comparing leakage to the outside before and after sealing;

4. Based on the protocol for "Combustion Appliance Zone Pressure Testing" forced air system operation shall not de-pressurize a combustion appliance zone by more than 3 Pascals.

5. When combustion appliances are located within a conditioned space a UL listed carbon monoxide alarm, or equivalent must be installed.

Sealing Materials: All duct sealing shall be done with mastics that meet NFPA Class 1 requirements and meet ASTM standards C557 and C919-79. Mastic applied to rigid metal ducts shall be listed as meeting UL 181A-M or UL 181B-M. Mastic applied to flex ducts shall be listed as meeting UL-181B-M. Mastic applied to duct board shall be listed as meeting UL-181A-M. Where taping is necessary (to provide service access), only UL-181 listed tape shall be used. Cloth duct tape is not acceptable.

Performance Tested Comfort Systems® Total Duct Leakage Test

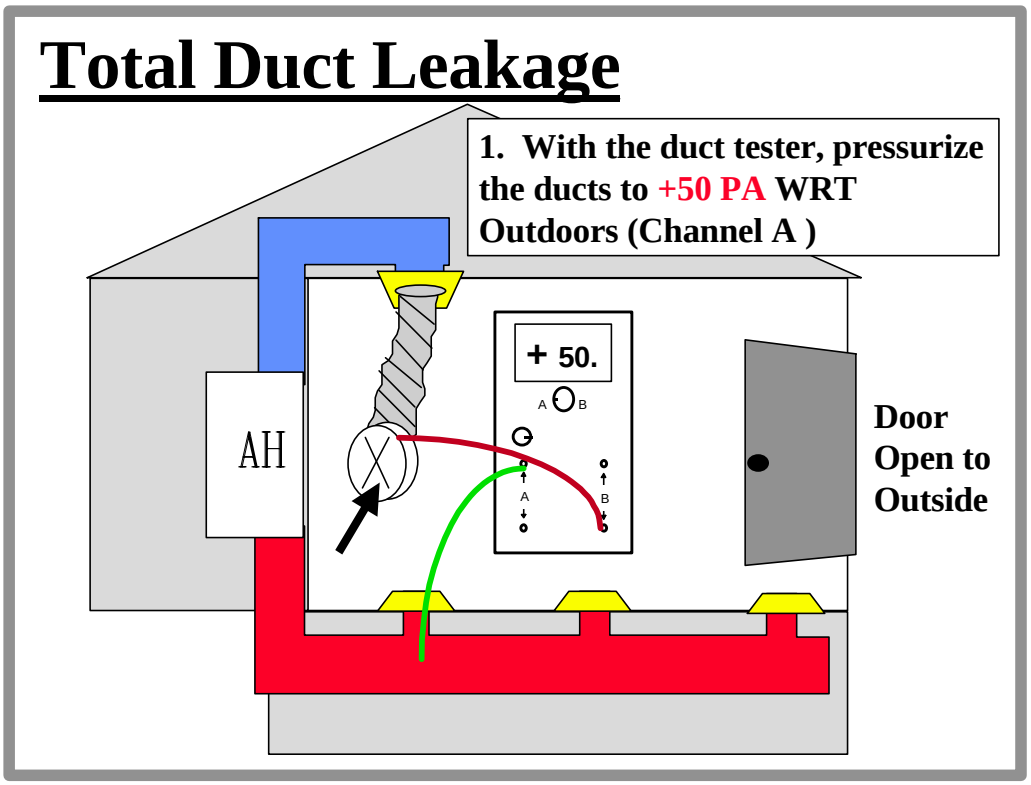
Testing Procedure

Application: For the PTCS® Program perform this test **only on new homes**. This test is most appropriate in new construction when ducts are to be tested at the rough-in stage before the house envelope is intact. The test measures the CFM_{50} value of the duct system. It is a simpler test, but is a more stringent standard than the leakage to exterior test that may be used as an alternative.

Standard: For certification, the measured CFM_{50} must not exceed 0.06 CFM_{50} x floor area served by the system (in square feet) or 75 CFM_{50}, whichever is greater.

Tools and Equipment:
- Duct tester
- Manometer
- Tape and paper or duct mask to seal registers

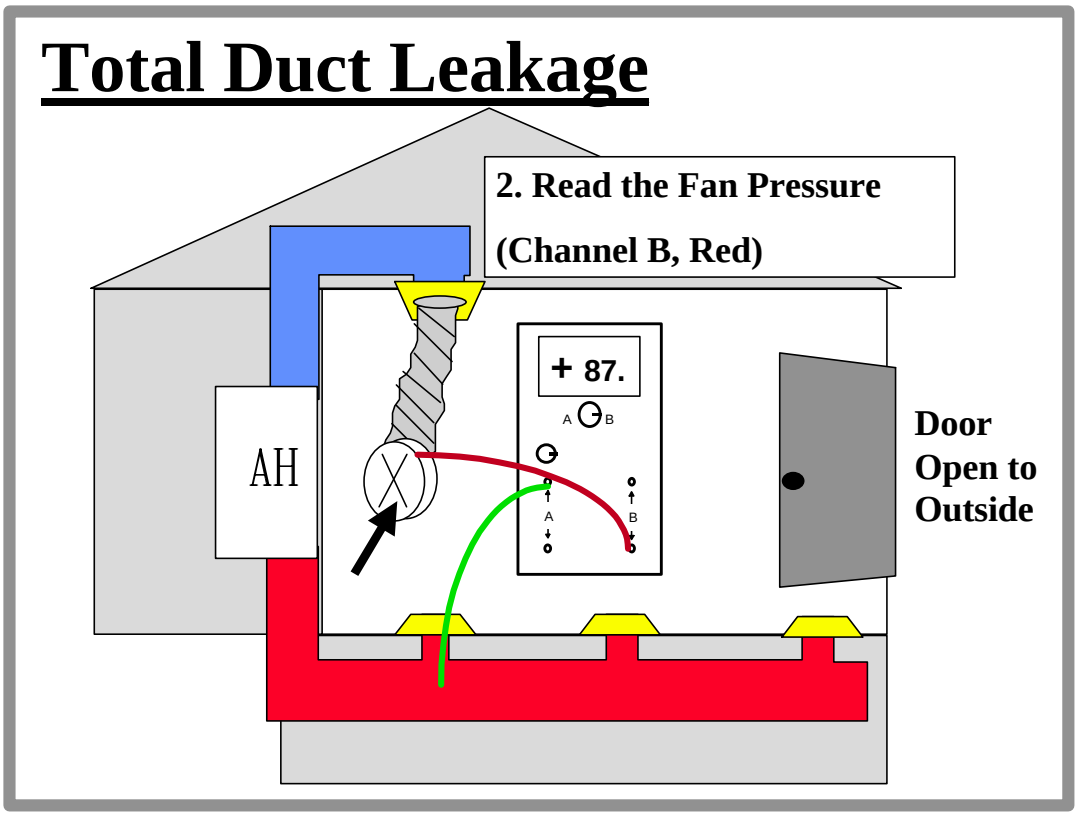
Setup:
- Remove air filters from the air handler.
- Open all duct dampers (Note setting and return after testing).
- Attach the duct tester to the return register closest to the air handler **or**
- Attach the duct tester to the air handler cabinet (Preferred location).
- Place the duct pressure tube in the supply register closest to the air handler **or**
- Place the duct pressure tube in the supply plenum.
- Seal all the duct system supply and return registers with tape, paper, or duct mask.
- Open an exterior door or window so that all spaces exterior to the ducts are at outside pressure.



Test:

1. With the Duct Tester **pressurize** the ducts to **+50 Pa WRT to outside**.

2. Read the fan pressure and follow your Duct Tester instructions to determine the **CFM_{50}** leakage of the system. If you can't reach +50 Pa perform the test at the highest attainable pressure (rounded to the nearest 5 Pa) and correct the results (see interpreting results below).



Interpreting Results:

The **CFM_{50}** is an approximation of the total area of holes in the home's ducts. However, the test pressure of 50 Pa is much higher than the pressures the leaks usually "see." As an approximation, the CFM_{50} divided by 10 gives the total leakage area in square inches.

Example: **400 CFM_{50}/10 = 40 square inches of total leakage area.**

Using this approximation during sealing can help estimate how many and how big the holes are that you are looking to seal.

If you could not perform the test at +50 Pa, adjust your results using Table 2 (see page 31).

Example: The results of the test show a leakage area of 275 CFM at a duct pressure of 35 Pa. The correction factor from Table 2 for a pressure of 35 Pa is 1.26.

275 CFM_{35} X 1.26 = 346.5 CFM_{50}

The test doesn't give any indication of where to find the holes, just an estimate of the collected hole size. As CFM_{50} values get larger, they will tend to be less accurate. In the range of values required for certification, the test should be most accurate.

Limitations: Inaccuracies are introduced because the test assumes a constant pressure difference from inside to outside the ducts throughout the system during testing. This is not always true because of pressure drops caused by large holes and possible induced pressures in buffer zones. Because the assumed constant pressure difference doesn't accurately model the dynamic pressure gradient present during normal system operation, the test measures hole size and does not always correlate well with heat loss and potential savings. The assumption, however, is that in new construction, the tighter, the better.

Duct Leakage to the Exterior

Testing Procedure

Application: This test may be used on either **new or existing homes**. In new construction, doors and windows must be installed and the building envelope capable of maintaining +50 Pa WRT outside pressure with the operation of a blower door. By pressurizing the interior of the home with a blower door while using a duct tester, duct leakage to the interior is eliminated from the measurement. The test attempts to measure the CFM_{50} value for holes in the duct system outside of conditioned space. In **existing homes**, by performing a pre and post-test documenting a 50% reduction in leakage area, it is sometimes possible to certify homes that otherwise would not qualify.

PTCS® Certification Standard:

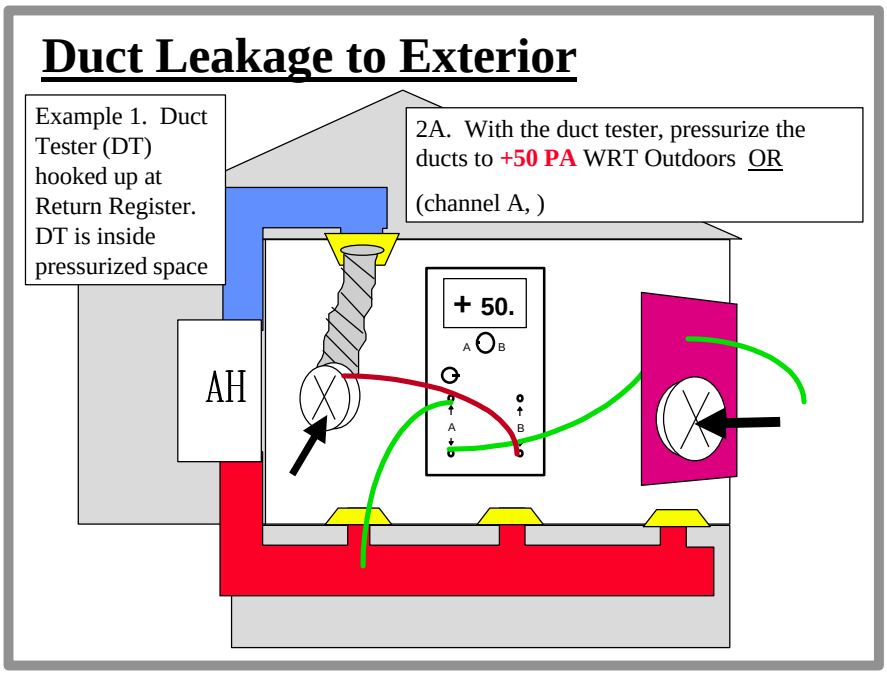
> **New Construction:** For certification, the measured CFM_{50} must not exceed 0.06 CFM_{50} x floor area served by the system (in square feet) or 75 CFM_{50}, whichever is greater.
>
> **Existing Homes:** For certification, the measured CFM_{50} must not exceed 0.10 CFM_{50} x floor area (in square feet) served by the system;
>
> **-OR -**
>
> Document a **50% reduction** in leakage to the outside by comparing duct leakage to the outside before and after sealing.

Energy Savings:

> **Existing Site Homes (Reserved)**
> **Existing Manufactured Homes -** It is not always possible to reduce the duct leakage of an existing manufactured home by the amount needed to meet the PTCS® certification standards. However, in these cases the reduction in duct leakage that is achieved still results improved system efficiency and produces energy savings. The amount of energy savings that a particular reduction in duct leakage produces is dependent upon the size and insulation levels in a home, type of heating system used in the home and the severity of the heating and cooling climate where the home is located. The following procedure may also be used to estimate savings based on the difference in net supply site leakage to the exterior at 25 Pascal (CFM_{25}) before and after duct sealing. A minimum difference of 40 CFM_{25} between the "pre" and "post" duct sealing tests is required in order to use this procedure.

Tools and Equipment:

- Blower Door
- Duct Tester
- Manometer
- Tape and paper or duct mask to seal registers
- **Setup:**



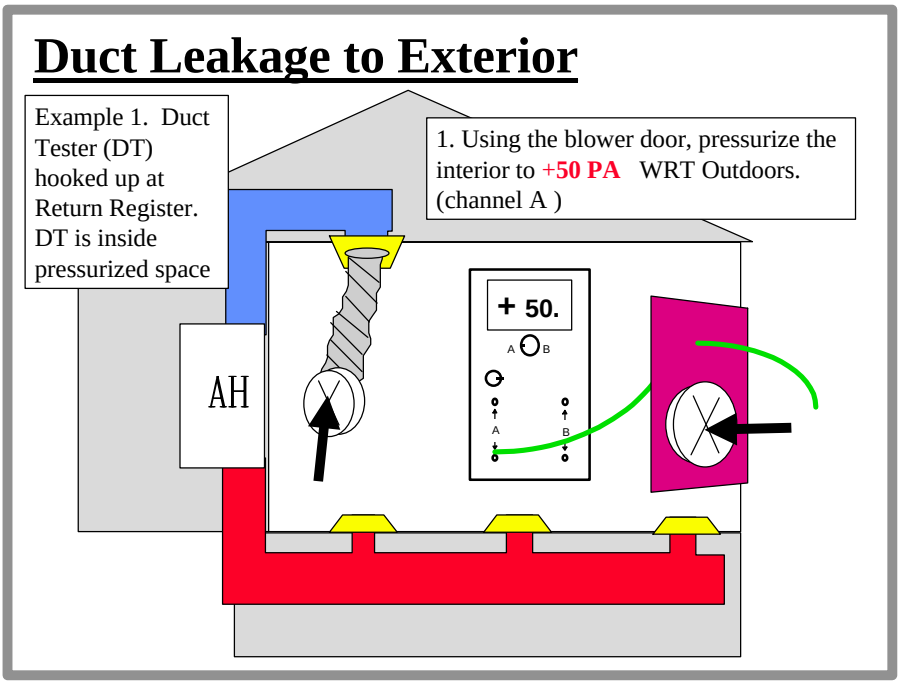
Example 1. Duct Tester is hooked up at largest return register. The duct tester is inside the pressurized zone of the house when the blower door is turned on.

- Prepare house for a standard blower door test.
- Set up **blower door** and set to pressurize the house.
- Set up the **Duct Tester** as in a total leakage test except all exterior doors and windows must be closed.

Test:

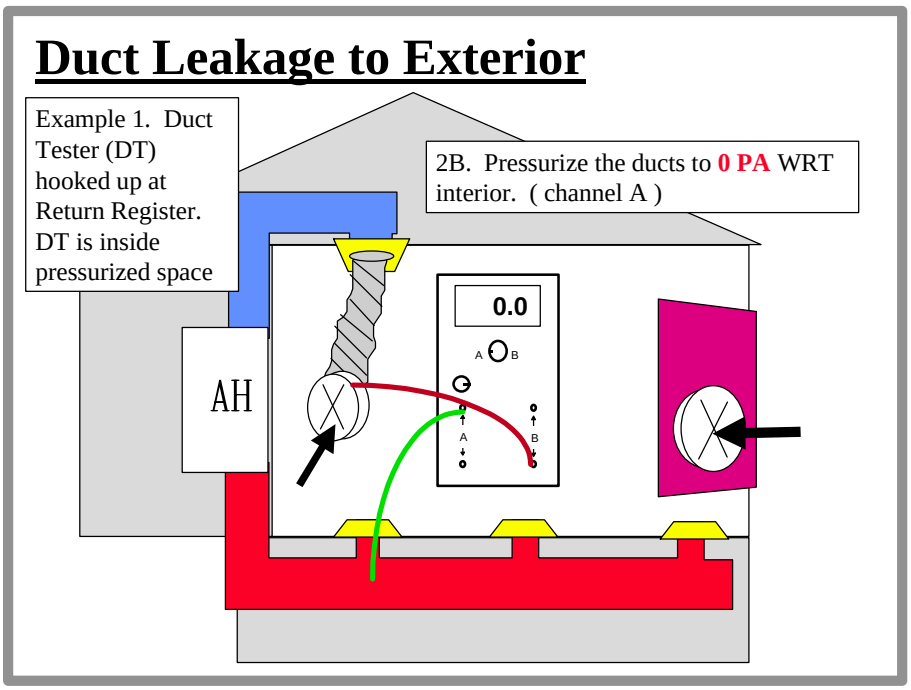
1. Using the **blower door** pressurize the interior to **+50 Pa WRT outdoors**.

2A. With the **Duct Tester**, pressurize the ducts to + **50 Pa WRT outdoors**.



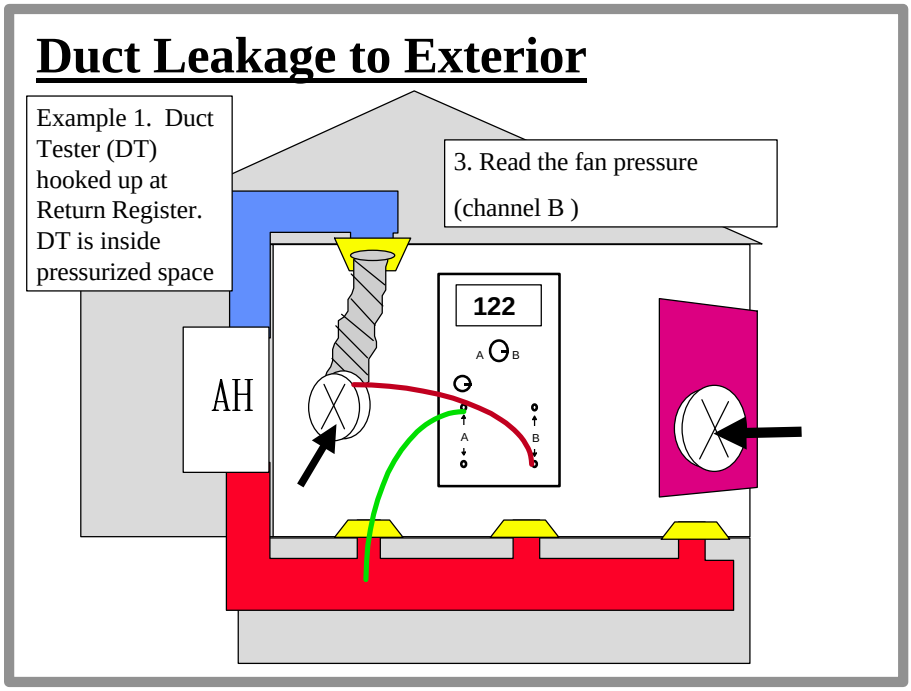
-OR -

2B. With the **Duct Tester**, pressurize the ducts to **0 Pa WRT interior**



Check the blower door reading to assure it is still at +50Pa.

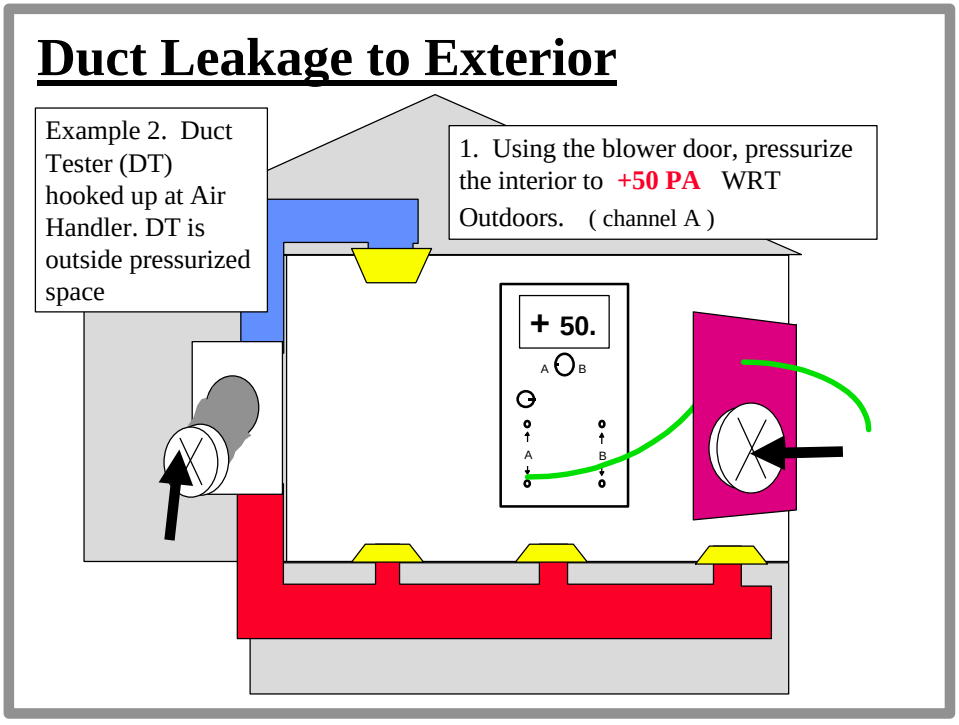
3. Measure Fan Pressure of the Duct Tester. **Note**: You may need to adjust the ring size of the duct tester (see duct tester manual).

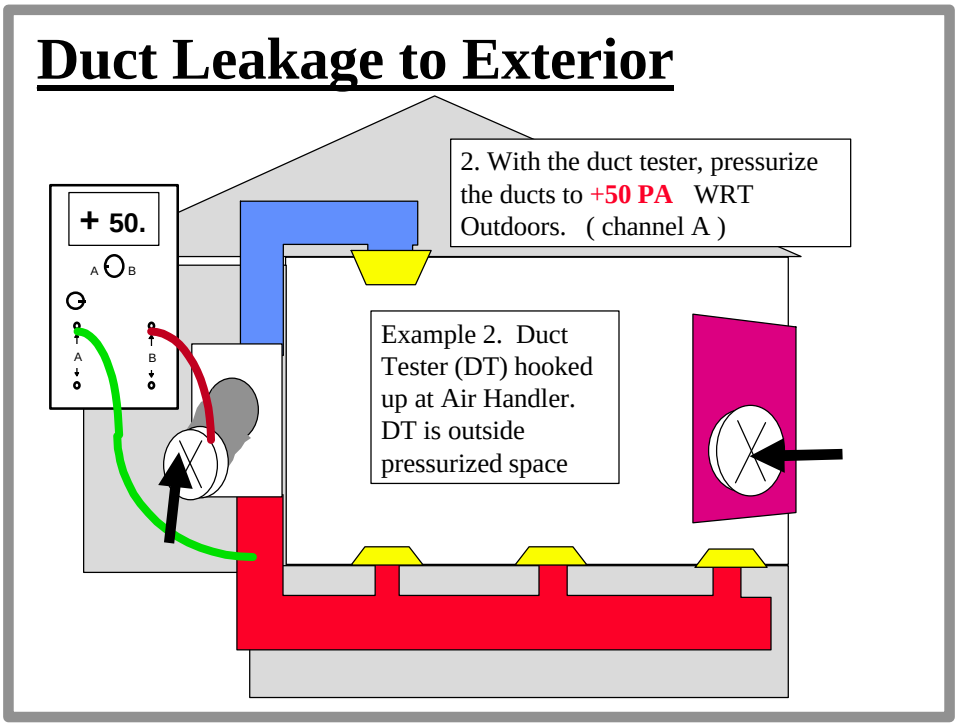


4. Convert Fan Pressure to CFM_{50} measurement by consulting the duct tester manual.

Example 2. Duct Tester is hooked up at Air Handler. Depending on the location of the Air Handler, the Duct Tester may be either inside or outside the pressurized zone of the house. (Outside in pictured example)

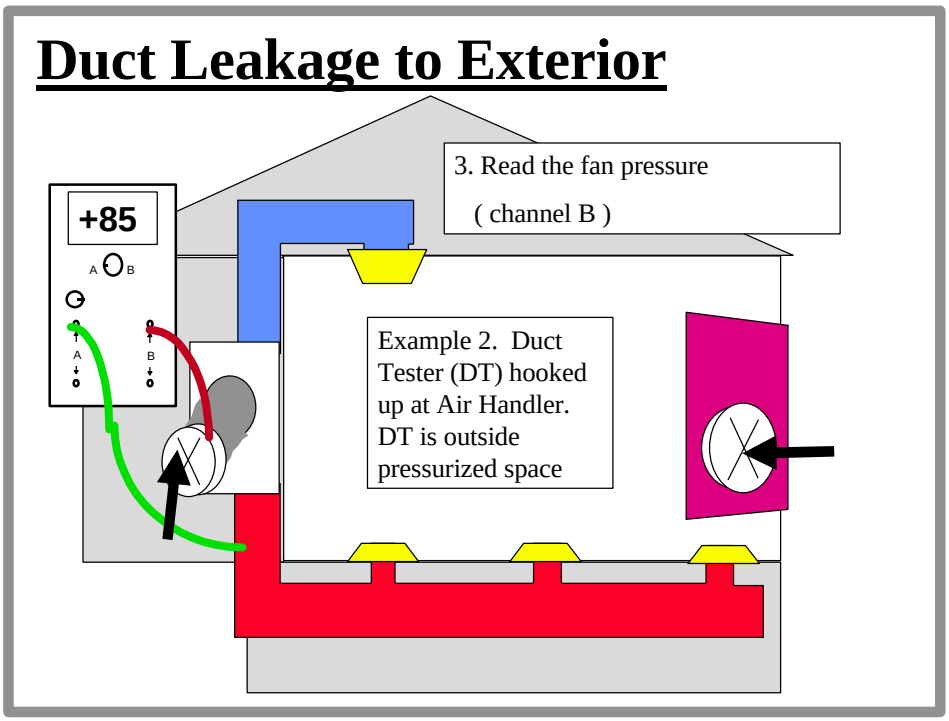
Follow the same steps as in Example 1.





Note:
In this example because the Duct Tester is outside of the pressurized zone of the house, it is no longer necessary to run a pressure hose from the reference pressure tap on channel A to the outside when determining the duct pressure WRT to outside as it was in Example A.

In any case, if either the house or the ducts can't be pressurized to 50 Pa WRT to outside, pressurize them both to highest same value possible (rounded to the nearest 5 Pa) and then convert to CFM_{50} using Table 2 (see page 31).



Interpreting Results:

By pressurizing the house to the same pressure as the ducts, holes between the ducts and the house are assumed to have no pressure difference and therefore make no contribution to the measured CFM_{50}. All the measured leakage is to the exterior. Generally this will be a more reliable indicator of potential energy savings than a *Total Leakage* test. The test doesn't give any indication of where to find the holes, just an estimate of the collected hole size to the outside. As CFM_{50} values increase, , they tend to be less accurate. In the range of values required for certification, the test should be most accurate. Documenting a 50% reduction of a very leaky system for certification may not provide the desired benefits. Always try to get the systems as tight as possible.

Limitations: The test assumes that the pressure inside the ducts and outside the ducts within the house are always equal during the test. This is not always true and may skew the results. Two story houses with ducts in the second story floor cavity and houses with ducts in other buffer zones that are partially pressurized by the blower door will produce unreliable results.

Combustion Appliance Zone Pressure Test

Testing Procedure

Application: This test is required for PTCS® Program Certification whenever a combustion appliance is present within a building. A **Combustion Appliance Zone (CAZ)** is any zone in the house that contains a combustion appliance. CAZs need not be heated. An attached garage or unheated basement with a combustion-fired furnace or water heater **is** a CAZ. A zone with a **sealed combustion appliance** that has an isolated combustion path preventing mixing of room air and combustion air **is not** considered a CAZ. The test measures the magnitude of any air handler-induced pressure effects within the combustion appliance zone. Supply leaks to the exterior and return leaks within a zone create negative pressures that may cause dangerous back drafting of combustion appliances. Door closer that isolates supply and return sides of the system may also induce negative pressure within a combustion appliance zone. In **retrofit** situations, the test should be done both before and after sealing. **Note:** This test only measures air handler-induced effects and is not a worst-case test.

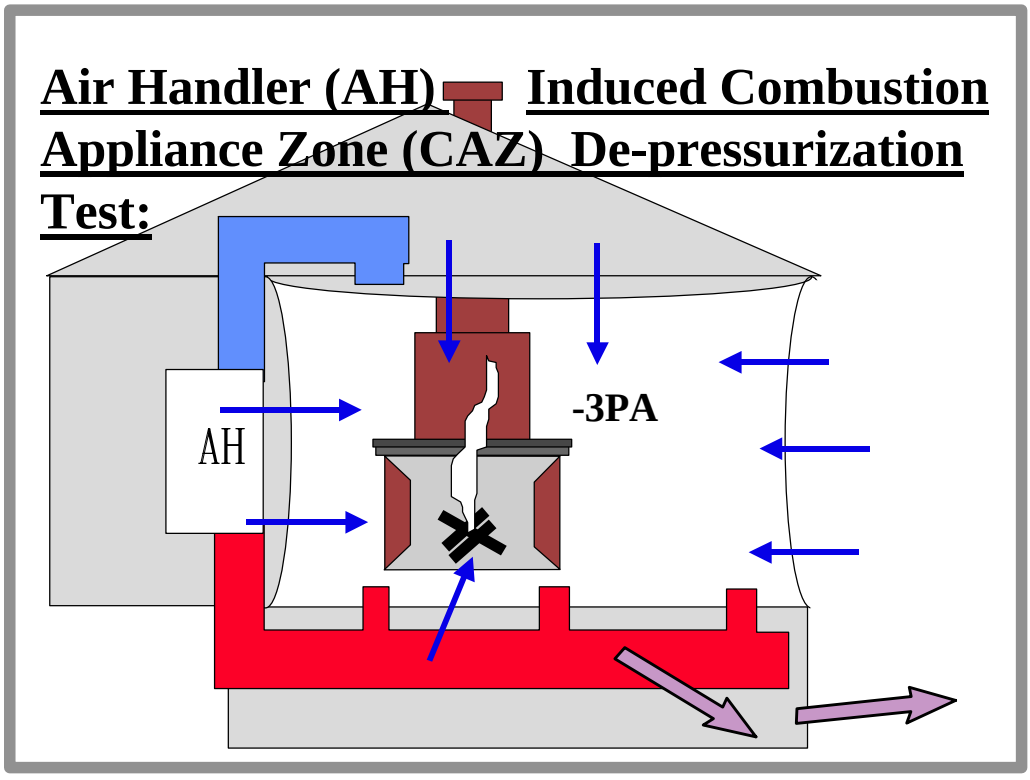
Standard: Forced air system operation shall not de-pressurize a combustion appliance zone by more than 3 Pascals with reference to outside. As a further safety precaution, the PTCS® Standard also requires the installation of an UL-listed carbon monoxide meter whenever combustion appliances are within the conditioned space of the home.

Tools:

- Micro-manometer

Set Up:

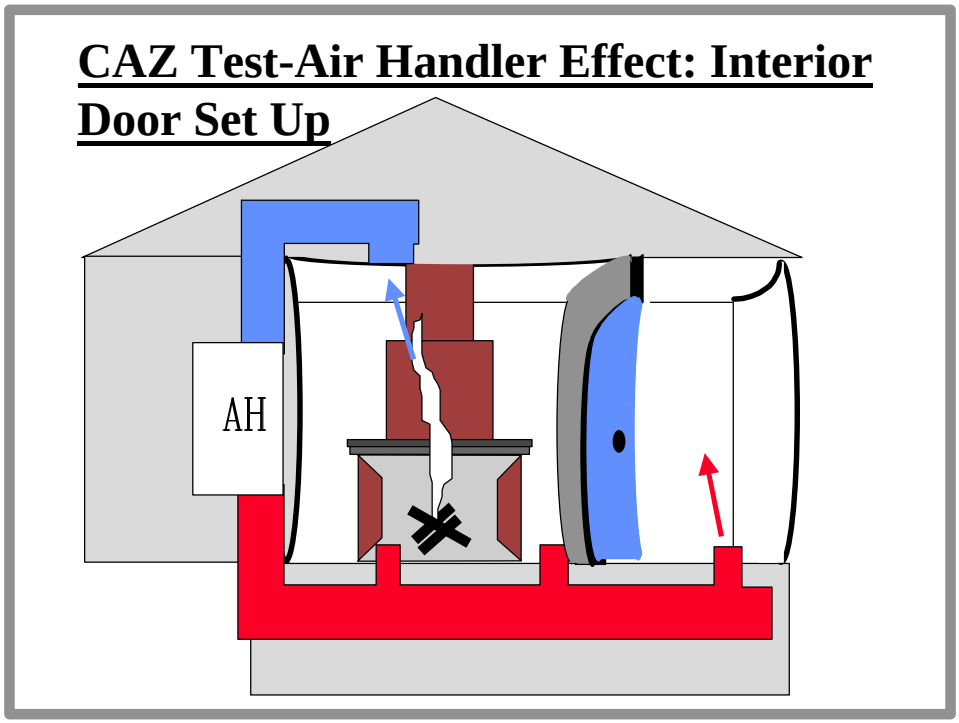
- The house should be set up for normal heating season operation with all **exterior doors and windows closed**.
- **Turn off all exhaust devices** including clothes dryer, bathroom fans, kitchen fan, central vacuum, and whole house ventilation systems.
- **Open** all return and supply **registers**.
- **Turn off combustion devices** so that they will not operate during the test (except furnace if air handler will not operate at high speed without the furnace firing).



- **Remove** furnace **filters.**
- **Shut** off any **outside ventilation air** to the duct system if it can normally be shut off during air handler operation.
- **Close manual flue dampers**

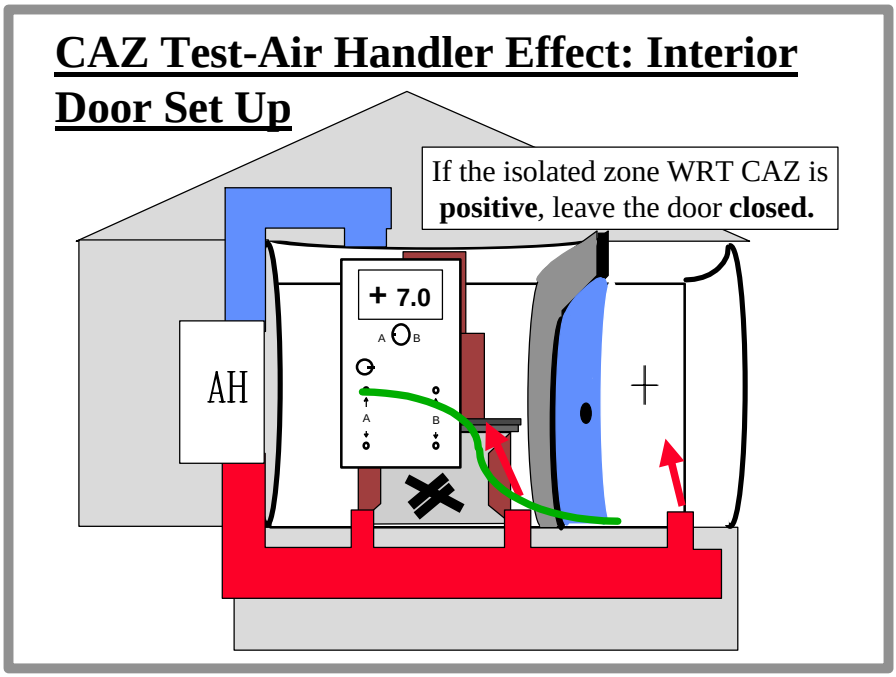
Door Set Up:

- With air handler operating (high speed if more than one speed);

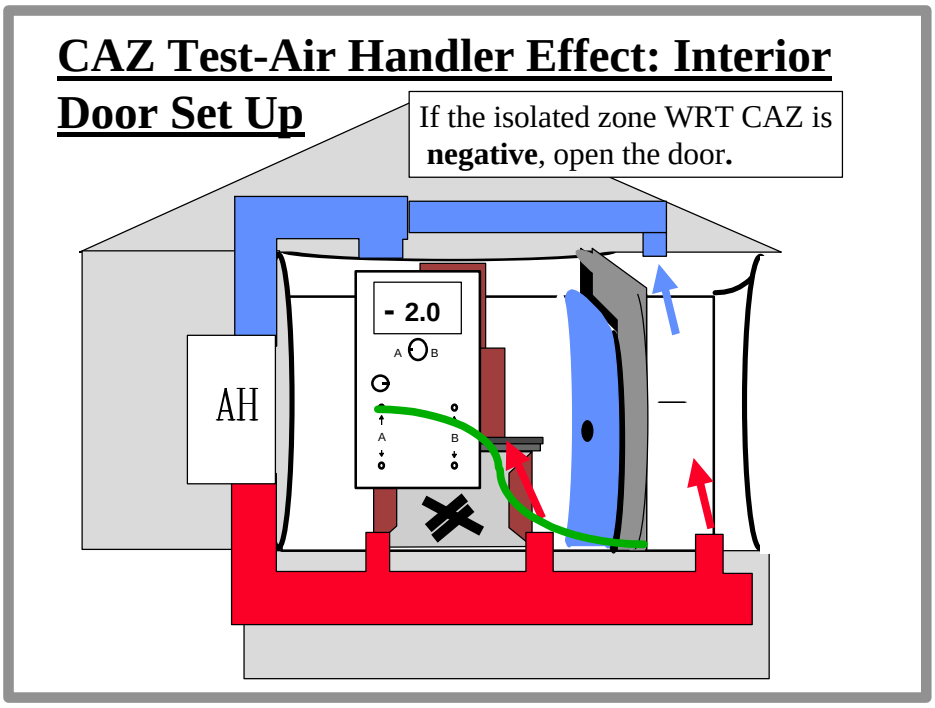


- Using the manometer, check the pressure in each zone isolated behind a closed door WRT to the CAZ.

1. If the zone behind the closed door is **positive** WRT to the CAZ, leave the door **closed** for the test

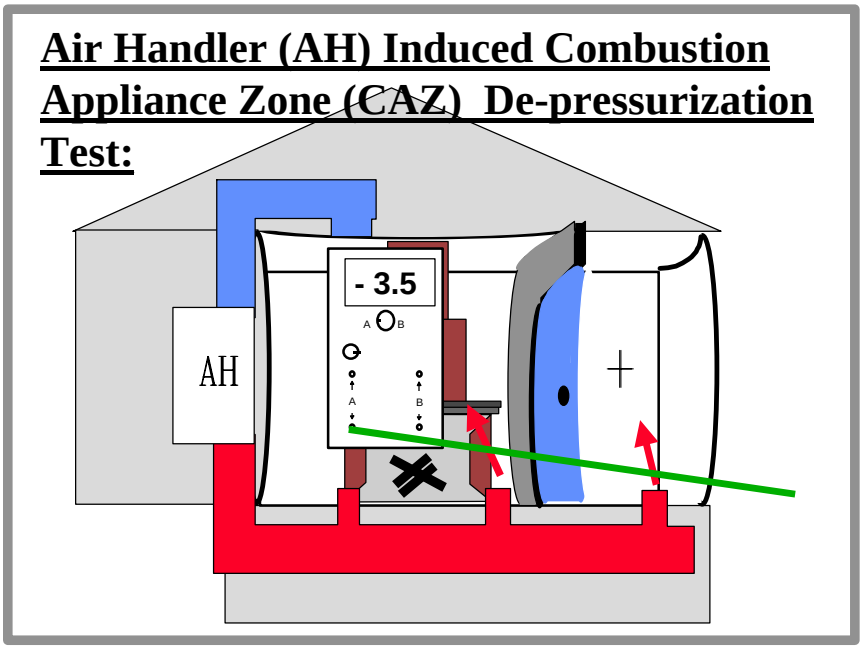


2. If the zone behind the closed door is **negative** WRT to the CAZ, **open** the door for the test.



Test:

- Establish a baseline.
- With the air handler off measure the pressure in the CAZ WRT outside.



3. Turn on air handler to high speed.
4. Record pressure of CAZ WRT outside.

Example:
Baseline pressure = **-1.0 PA**
CAZ test = **-3.5 PA**

NET air handler effect **equals** CAZ test pressure **minus** baseline pressure.

NET air handler effect = -3.5 - (-1.0) = **-2.5 PA**

Interpreting Results:

If the net **Air Handler Effect** de-pressurizes the system by less than **3.0 Pa** the system meets the Climate Crafters Program Standard.

If the depressurization is more than 3.0 Pa, modifications must be made to reduce the de-pressurization. If the supply ducts have been well sealed, the induced depressurization is most probably a result of door closure effects and may be mitigated by undercutting doors, by installing transfer grilles or new returns into rooms without returns, or possibly by providing supplemental make-up combustion air to the CAZ.

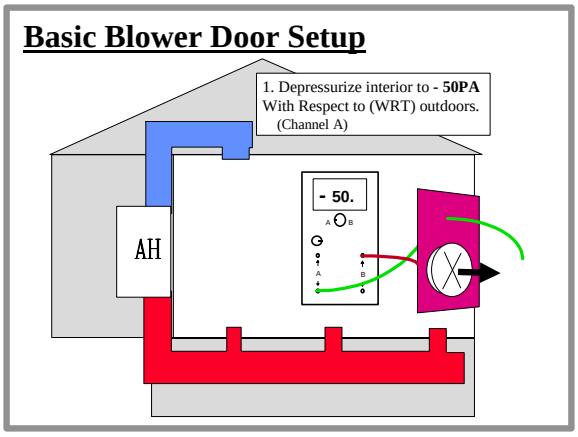
Limitations: The test procedure described only measures air handler-induced effects. The added effects of other exhaust appliances such as bath fans, range hood exhausts, dryers, central vacuums, etc. may still induce back drafting. To ensure safety, a worst-case test including these other appliances is recommended.

Basic Blower Door Setup

Application: The basic setup and operation of a Blower Door is an integral part of the ***Duct Leakage to the Exterior*** test. The blower door can also be used to verify the **Minimum Ventilation Level** (MVL) required for a house when there is no whole house mechanical ventilation system present.

Tools:
- Blower Door
- Manometer

Set Up:
- Open all register dampers.
- Close all exterior doors and windows.
- Open all interior doors
- Close fireplace or wood stove dampers and doors. Cover ash with wet newspaper. (In some cases it may be necessary to tape opening).
- Turn down combustion water heater so it will not fire during the test (i.e. set to pilot and check to confirm pilot is still lit after testing. Re-light if necessary.).
- Turn off all exhaust devices including: clothes dryer, bath fans, kitchen fans, and central vacuum cleaner.
- Set thermostat to Off so HVAC system will not come on during testing.
- Turn all ventilation controls to Off position.
- Set up blower door. Channel A, pressure tap, house WRT out doors. Channel B, fan pressure WRT house.



Test:
Adjust hole size and/or fan speed to pressurize or depressurize the house as needed.

Danger! Never perform test if any combustion appliance is operating: water heater on, fire going in in fireplace or wood stove, gas ovens or range top operating, etc.

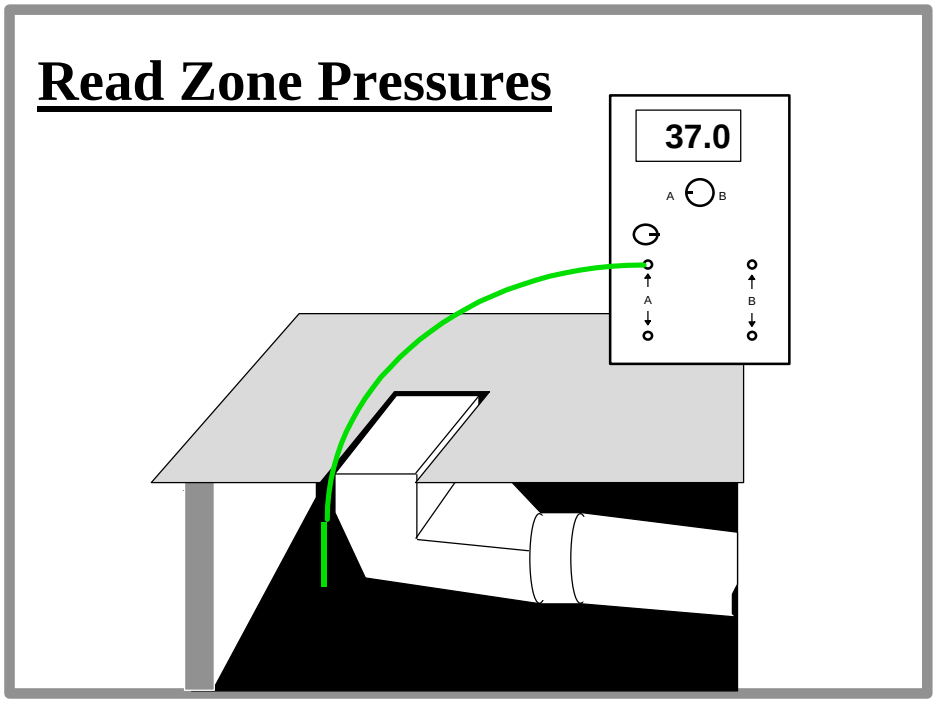
When testing is complete, reset thermostat, water heater and other controls to original settings.

Zone Pressure Testing

Application: Determination of pressure in one Zone with reference to (WRT) another. This test is especially useful for determining the pressure boundary of a building. When ducts appear to be outside of conditioned space in attics, crawlspaces, etc., or in other intermediate zones like floor cavities, this test determines to what extent these zones are connected to the outside.

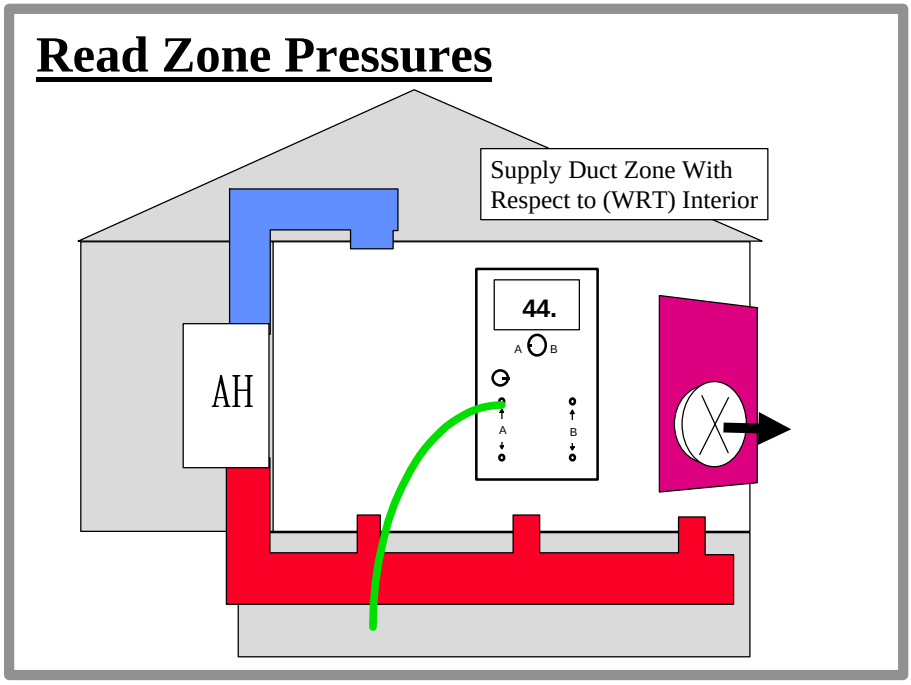
Tools:
- Blower Door
- Manometer
- Metal Probe
- Awl

Set Up:
Set up house for basic blower door test. Determine access points between zones for pressure probe.



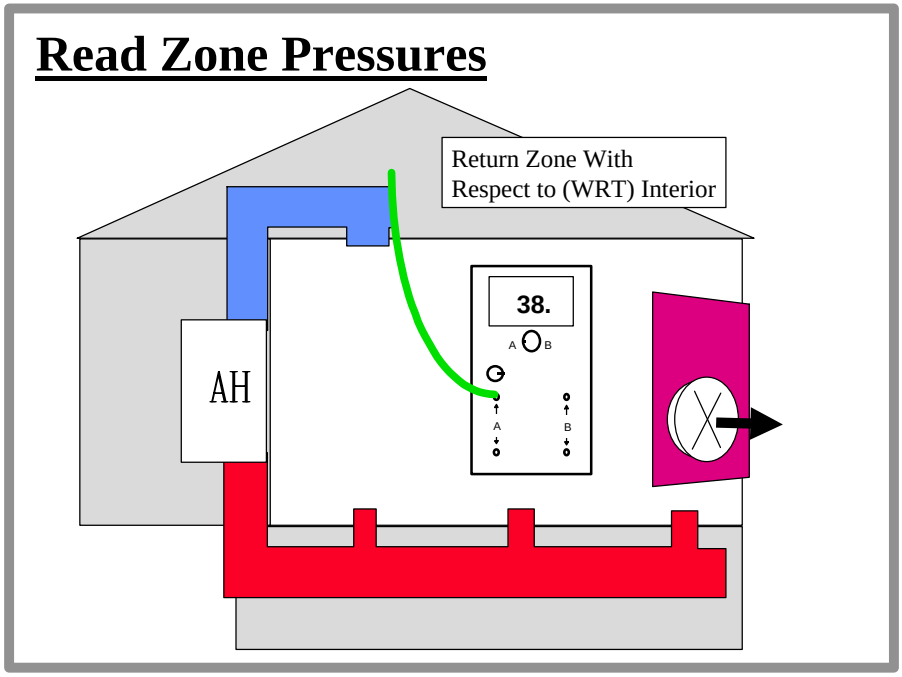
Test:

- De-pressurize the house to - 50 Pa using the blower door.
- Insert pressure probe into zone to be tested.
- Zones of interest: Attic, Crawlspace, Basement, Attached Garage, Wall Cavities, Floor Cavities between floors, Any Zone containing Ducts or the Air Handler.



Interpreting the results:

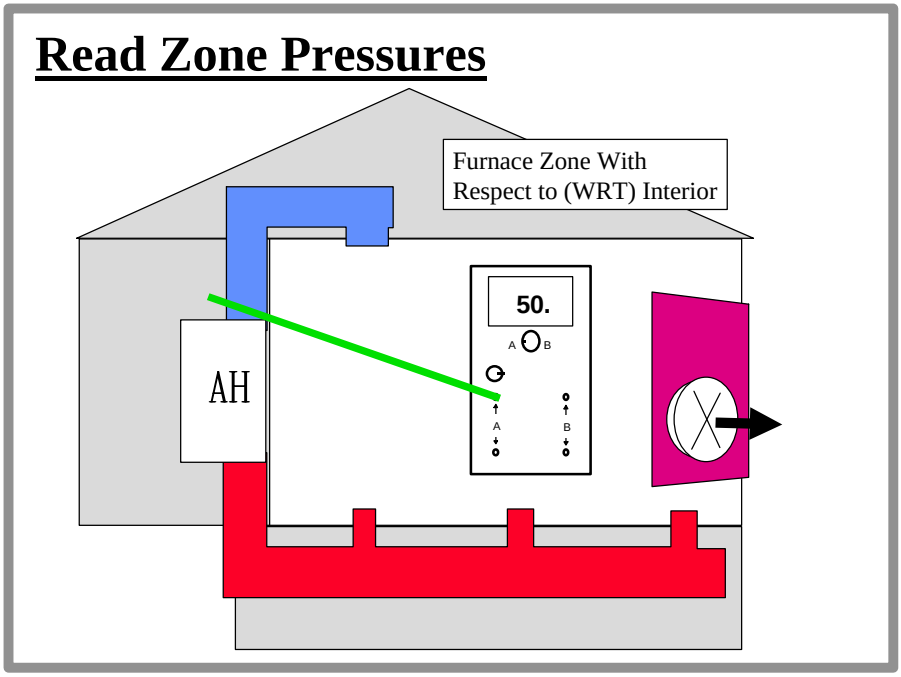
1. Any zone <u>totally outside</u> the house and totally connected to the outside should show the same pressure as the outside WRT the house i.e.. 50 Pa or 0 Pa if the pressure is measured as the zone WRT outside.



2. Any zone totally inside the house will be at the same pressure as the house and will show no pressure difference i.e.. 0 Pa WRT to the house.
3. Zones with readings between 0 Pa and 50 Pa WRT house are part of a series leakage path. Pressures closer to 50 Pa WRT house will be in zones more closely connected to the outside. Pressures closer to 0 Pa WRT house are more closely connected to the interior. A Zone at 25 Pa is equally connected to the interior and exterior. An attic or crawlspace is considered well vented with a zonal pressure 47 to 50 Pa WRT house.

Example

This air handler (AH) is totally outside the conditioned area of the house.



Minimum Ventilation Level

Application: Whenever air sealing (including duct sealing) is performed, the overall tightness of the house envelope should be measured in order to estimate the potential for moisture and/or indoor air quality (IAQ) problems. The measured CFM_{50} of the house as determined from a blower door test may be used to estimate house ventilation as compared to suggested Minimum Ventilation Level (MVL) guidelines. Sealing a house below the MVL should only be undertaken if some provision is made or already exists to provide whole house mechanical ventilation adequate for the expected occupancy.

Standard: The ASHRAE standard for residential ventilation is based on providing **15 CFM** per occupant. In homes of typical size and occupancy, this is equivalent to approximately **0.35 air changes per hour (ACH)**.

Calculations: The MVL for a house may be calculated based on: **(1)** the known number of occupants; **(2)** an estimate of the possible number of occupants based on the number of bedrooms; or **(3)** the air change rate and volume of the house. Generally the most restrictive of these methods should be applied to provide an additional margin of safety.

1. **MVL based on known occupancy:**

MVL = (# of Occupants) x (15 CFM/occupant)

2. **MVL based on bedrooms:**

   MVL = (# of bedrooms + 1) x (15 CFM/bedroom)

3. **MVL based on ACH and volume**

$$\text{MVL} = \frac{0.35\ \text{ACH} \times \text{Volume of House (ft}^3\text{)}}{60\ \text{minutes}}$$

Each of these calculations yields an estimate of the required ventilation (in cfm) to maintain good indoor air quality.

The following formula **(4)** is used to convert the measured CFM_{50} from the blower door test to an estimate of the average ventilation potential (in CFM):

4. **Ventilation Potential = CFM_{50}/N**

   Where N is a correlation factor: N = C x H x S

   C = climate factor, a function of annual temperature and wind. C = 20 is an appropriate approximation for most areas in the Northwest
   H = height correction factor (see Table 2)
   S = wind shielding correction (see Table 3)

As long as the measured **Ventilation Potential** is greater than the **MVL,** additional air sealing should be possible without creating moisture and IAQ problems.

Table 2. Height Correction Factor

Number of Stories	1	1.5	2	3
Correction Factor "H"	1.0	0.9	0.8	0.7

Table 3. Wind Shielding Correction Factor

Wind Exposure	Well Shielded	Normal	Exposed
Correction Factor "S"	1.2	1.0	0.9

Example Calculation:

Given a 1200 ft^2 house with 8 ft ceilings, 3 bedrooms, single story, in an exposed windy site and 6 occupants with a tested CFM_{50} = 1800. Volume = 1200 x 8 = 9600 ft^3.

1. MVL based on known occupancy:

MVL = 6 x 15 = 90 CFM

2. MVL based on bedrooms:

MVL = (3 + 1) x 15 = 60 CFM

3. MVL based on ACH and volume:

MVL = (0.35 x 9600) / 60 = 56 CFM

The MVL based on occupancy of **90** CFM is the most restrictive and should be used as the target value.

Using the values of **C = 20** and **H = 1** and **S = 0.9** taken from **Tables 1 & 2**.

N = 20 x 1 x 0.9 = 18

Calculating the **Ventilation Potential = 1800/18 = 100 CFM** is greater than the MVL.

Limitations: The CFM_{50} of a house is only an approximate measurement of the effective leakage area. Estimating the amount of ventilation that a given leakage area will provide is affected by many factors and is at best an approximation averaged over a wide range of conditions for the entire year. Periods of over and under ventilation will certainly occur. A properly sized and controlled mechanical ventilation system installed in a tight house envelope is the preferred alternative to assure adequate ventilation rates at all times.

Terminology

ACH – Air Changes per Hour.
CAZ – Combustion Appliance Zone.
CFM_{50} – airflow through a test volume at an induced pressure of 50 Pascals.
MVL – Minimum Ventilation Level. Based on ASHRAE Standard of 15 CFM per occupant.
Pascal – metric unit of pressure. 1 inch of water column = 249 Pascals.
WRT – With Reference To. The pressure in the house was 25 Pascals WRT outside.

CERTIFIED
RESIDENTIAL AIR DUCT SYSTEM

«CERT NUMBER»

«CONTRACTOR / NUMBER»

Phone: «CONT PHONE»

CLIMATE CRAFTERS

1 (877) 448 0143

Sponsored By:

TECHNICIAN:_____

TECHNICIAN #:_____

SERVICE DATE:_____

FILTER SIZE:_____

«UTILITY»

If combustion appliances are present a CO^2 MONITOR must be installed.

Heat pumps and gas furnaces need yearly maintenance and electric furnaces need maintenance every five years.

CERTIFIED
RESIDENTIAL AIR DUCT SYSTEM

CLIMATE CRAFTERS

1 (877) 448-0143

CERTIFICATION NUMBER: «Cert Number»

CUSTOMER: «Customer»
ADDRESS: «Address»
«City,» «State» «Zip»

SERVICE DATE: «Service Date»
CONTRACTOR: «Contractor»
CONTRACTOR#: «Contractor #»
TECHNICIAN: «Technician»
TECHNICIAN#: «Technician #»
UTILITY: «Utility»

If combustion appliances are present a CO^2 MONITOR must be installed.

Heat pumps and gas furnaces need yearly maintenance and electric furnaces need maintenance every five years.

Certified Ducts Reporting Form

CLIMATE CRAFTERS

Customer Name_____ **Date Tested**_____

Address_____

Phone _____ **Utility** _____

Contractor _____ **Certified Technician** _____

Conditioned Floor Area (ft^2) _____ **CFM50 of House** _____

Type of Heat? **Electric Furnace** **Heat Pump** **Other**

New Construction

Total Duct Leakage Test ☐ **Or** **Duct leakage to the Exterior** ☐

CFM50 leakage	Calculated target*

*75 CFM50 or 0.06 x floor area whichever is larger

Retrofit

Duct Leakage to the Exterior:

Pre –Sealing CFM50 Leakage	Post Sealing CFM50 Leakage	Target[1] or Reduction[2]

[1] 0.10 x floor area or
[2] 50% reduction

Combustion Zone Test

Air handler induced depressurization of combustion appliance zone(s) less than 3 Pascals. ☐ **CO Monitor?** _____ **No combustion.** ☐

Climate Crafters Mobile Home Duct Sealing Input Form

Last Name:	Date:	Utility:
First Name:	Address:	
Phone #1	Phone #2	Account #

Home Info:				
Dimension:	L	x W	sq ft	H
Make:			Year Built:	
# Residents:		( ) Doublewide ( ) Singlewide		
Windows:	( ) Good	( ) Leaky	( ) Very leaky	

Combustion Appliances?		( ) yes ( ) no
Gas Appliances?		( ) yes ( ) no
CO Test: ( ) yes ( ) no		Results:
Worst case Pre:		CO Monitor Installed?
Worst case Post:		( ) yes ( ) no
Where Monitor Installed:		

Heating System:	Make	Model #
( ) Electric furnace		
( ) Central AC (only)		
( ) Heat Pump		
Furnace Filter Size:		

Company:	**Phone:**
Technician:	**CC#**
Tech 2:	

Super Good Cents	( ) yes ( ) no
SGC Sticker #	
Location of sticker:	
( ) Panel	( ) Furnace
( ) Sink	( ) Homeowner Paperwork

BLOWER DOOR

	House	Fan Press	Ring	Flow	Belly
PRE					
POST					

DUCT BLASTER

	DUCTS	Fan Press	Ring	Flow
Pre Total				
Post Total				
	DWRTO	Fan Press	Ring	Flow
Pre to Out				
Post to Out				

NOTES:

Complete even if no other service is performed:

Utility Request Add-On Items (indicate number)

(____) Indoor CFL (____) Furnace Filters

(____) Outdoor CFL (____) Energy Packet

If ineligible, why: ( ) Gas Heat ( ) Baseboard

( ) Duct Type Explain:

( ) Out of Scope

CHECKED PANDUIT STRAPS?	( ) yes ( ) no	
Boots sealed	( ) yes ( ) no	
End caps installed	( ) yes ( ) no	
EXPLAIN IF NO:		
Furnace-to-plenum: how accessed? ( ) Top ( ) Bottom		
If you did not acess furnace to plenum connection, WHY NOT?		
Road Barrier: how patched?		

Job Type:	**( ) Pass**	**( ) Fail**
( ) Test Only		( ) Test and Seal + Crossover
( ) Test and Seal		
( ) Test, Seal, Plus Cavity Return Fix		
( ) Test, Seal, Plus Outside Return Fix		

PTCS Qualification Options:

Option 1 for duct blaster-(sq.ft.)(0.10)=cfm50:	**Sq.ft.**		**X .1 =**		**Leakage:**
Option 2 for duct blaster- (precfm50out)(.5)=postcfm50:	**CFM out**		**X .5 =**		**Reduction:**
Explain if test only or failed:					

ACKNOWLEDGMENT & RELEASE:

I acknowledge that _____ tested and/or performed work on this manufactured/mobile home. I understand that this program is FREE, courtesy of _____. If Climate Crafters selects my home for a comprehensive review, I agree to permit access to my home by a representative of Climate Crafters for an inspection on the work performed by the contractor and a brief conversation with the representative. I also give my permission for my electric utility to provide a representative of Climate Crafters with my electric billing information, which Climate Crafters will use to estimate savings.

Signature of Home Owner _____ ***Date:*** _____

Certificate Number:_____

PTCS Duct Sealing Checklist and Reporting Form

Customer Last Name:		**Date Tested:**		
Customer First Name		**Year house built**		
Customer Address:				
Certified Technician				
Contractor				
Utility				
Blower Door Tests	**House Pressure**	**Fan Pressure**	**Ring**	**Flow / ACH N**
1st Test				/
2nd Test				/
3rd Test				/
Conditioned Floor Area (sq.ft.)	**Avg. Height (ft.)**	**Volume (cu.ft.)**	**ACHN=((cfm@50PA*60)/volume)/20**	
Duct Blaster Total Tests	**House Pressure**	**Fan Pressure**	**Ring**	**Flow**
1st Test				
2nd Test				
3rd Test				
Duct Blaster to Exterior Tests	**House Pressure**	**Fan Pressure**	**Ring**	**Flow**
1st Test				
2nd Test				
3rd Test				
CAZ WORST CASE? ZONE				
Appliances in Zone				
Worst depressurization pre:				
Worst depressurization post:				
Combustion Safety Testing	**Appliance 1**	**Appliance 2**	**Appliance 3**	**Appliance 4**
Background Co level:				
Appliance Tested				
Draft Pressure				
Spillage at 5 minutes yes/no				
Co in flue pipe				
Co at heat exchanger				
Cracked heat Exchanger				
Make up air to spec?				
Venting to Code?				
O2 or CO2 reading				
Net stack temp				
Combustion efficiency				
Describe heating system:	**Size**	**Filter Type**	**Filter Condition**	
Air conditioning				
Gas furnace				
Electric furnace				
Heat Pump				
Describe duct system				